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(54) **ELEVATOR APPARATUS**

AUFZUGSVORRICHTUNG

APPAREIL ASCENSEUR

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The file contains technical information submitted after the application was filed and not included in this specification

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Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator apparatus that raises and lowers a single car by a plurality of hoisting machines.

BACKGROUND ART

[0002] In recent years, with increases in building heights, elevator are being sought that can move more passengers sooner. In answer to this, one method is to enlarge the car, but in order to do that, a larger hoisting machine that has greater torque and higher output is required, increasing manufacturing costs, and lifting and installation costs, etc. In answer to that, an elevator apparatus has been proposed that raises and lowers a single car using two hoisting machines without enlarging the hoisting machines (see Patent Literature 1, for example).
Similarly, patent literature 2 discloses an elevator system having two drive sheaves rotated in synchronous with each other by respective motors. The rope suspending an elevator car and the balance weight is hung over two drive sheaves. Therefore, although the length of the portions of the rope that are in contact with the sheave is increased, the diameters of the sheaves themselves can stay comparatively small. As a result, a necessary space for the hoisting machine section in an elevator hoistway can be reduced. To control the braking of a hoisting machine, patent literature 3 discloses a brake controlling means which controls braking apparatuses by detecting running states of the car upon emergency braking and controls braking forces from braking apparatuses of the hoisting machines in response to the detected running state.

[0003]

[Patent Literature 1]
Japanese Patent Publication No. HEI 7-42063 (Gazette)
[Patent Literature 2]
Japanese Patent Publication No. JP 2006-168978A
[Patent Literature 3]
Japanese Patent Publication No. JP 2008-198542A

[0004] Patent literature WO2006/092967A1 discloses the preamble of claim 1 and claim 3.

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0005] In conventional elevator apparatuses such as that described above, since no consideration has been given to how to stop the two hoisting machines during emergency braking, there has been a risk that timing of operation of the braking apparatuses of the two hoisting machines may be unintentionally out of synchronization, or deceleration of the car may become excessive.

[0006] The present invention aims to solve the above problems and an object of the present invention is to provide an elevator apparatus that can decelerate and stop a plurality of hoisting machines more appropriately during emergency braking.

MEANS FOR SOLVING THE PROBLEM

[0007] In order to achieve the above object, according to one aspect of the present invention, there is provided an elevator apparatus particularly including: a plurality of hoisting machines that have respective braking apparatuses; a car that is raised and lowered by the hoisting machines; and a plurality of brake controlling means that control the respective braking apparatuses individually, wherein the respective brake controlling means detect states of rotation of the respective hoisting machines during emergency braking, and control braking forces from the respective braking apparatuses in response to the detected states of rotation.
According to another aspect, there is provided an elevator apparatus including: a plurality of hoisting machines that have respective braking apparatuses; a car that is raised and lowered by the hoisting machines; and a brake controlling means that controls the braking apparatuses, wherein the brake controlling means detects a state of rotation of any one of the hoisting machines during emergency braking, and controls braking forces from at least two of the braking apparatuses of the hoisting machines in response to the detected state of rotation.
According to yet another aspect, there is provided an elevator apparatus including: a plurality of hoisting machines that have respective braking apparatuses; a car that is raised and lowered by the hoisting machines; and a brake controlling means that controls the braking apparatuses, wherein the brake controlling means detects a running state of the car during emergency braking, and controls braking forces from at least two of the braking apparatuses of the hoisting machines in response to the detected running state.
According to yet another aspect of the present invention, there is provided an elevator apparatus including: a plurality of hoisting machines that have respective braking apparatuses; a car that is raised and lowered by the hoisting machines; a brake controlling means that controls the braking apparatuses; and an emergency stop detecting means that detects generation of an emergency stop command, wherein: the emergency stop detecting means immediately makes the braking apparatus of at least one of the hoisting machines perform a braking action by disconnection from the brake controlling means when generation of an emergency stop command is detected; and the brake controlling means controls a braking force from the braking apparatus of at least one of the hoisting machines that is subject to control during

emergency braking such that deceleration of the hoisting machine that is subject to control is at a predetermined rate of deceleration.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Figure 1 is a structural diagram that shows an elevator apparatus according to Embodiment 1 not part of the present invention;
Figure 2 is a graph that shows time variations of rotational speed, deceleration, an energizing command to an electromagnetic coil, and current in the electromagnetic coil during emergency braking of one of the hoisting machines from Figure 1;
Figure 3 is a structural diagram that shows an elevator apparatus according to Embodiment 2 of the present invention;
Figure 4 is a graph that shows time variations of rotational speed, an energizing command to an electromagnetic coil, and current in the electromagnetic coil during emergency braking of one of the hoisting machines of an elevator apparatus according to Embodiment 3 of the present invention;
Figure 5 is a structural diagram that shows an elevator apparatus according to Embodiment 4 not part of the present invention;
Figure 6 is a structural diagram that shows an elevator apparatus according to Embodiment 5 not part of the present invention;
Figure 7 is a structural diagram that shows an elevator apparatus according to Embodiment 6 not part of the present invention; and
Figure 8 is a structural diagram that shows an elevator apparatus according to Embodiment 7 of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0009] Preferred embodiments of the present invention will now be explained with reference to the drawings.

Embodiment 1

[0010] Figure 1 is a structural diagram that shows an elevator apparatus according to Embodiment 1 not part of the present invention. In the figure, a car 1 and a counterweight 2 are suspended inside a hoistway by a suspending means 3, and are raised and lowered by driving forces from first and second hoisting machines 4 and 5. The suspending means 3 includes at least one first main rope 6 and at least one second main rope 7. Ropes that have a circular cross section or belt-shaped ropes can be used as the first and second main ropes 6 and 7.

[0011] The first hoisting machine 4 has: a first drive sheave 8; a first motor 9 that rotates the first drive sheave 8; a first brake wheel 10 that is rotated together with the first drive sheave 8; and a first braking apparatus 11 that brakes rotation of the first brake wheel 10 and the first drive sheave 8.

[0012] The first braking apparatus 11 has: a first brake shoe that can be placed in contact with and separated from the first brake wheel 10; a first brake spring that presses the first brake shoe against the first brake wheel 10; and a first electromagnet that acts against the first brake spring so as to separate the first brake shoe from the first brake wheel 10. A first electromagnetic coil is disposed on the first electromagnet.

[0013] The second hoisting machine 5 has: a second drive sheave 12; a second motor 13 that rotates the second drive sheave 12; a second brake wheel 14 that is rotated together with the second drive sheave 12; and a second braking apparatus 15 that brakes rotation of the second brake wheel 14 and the second drive sheave 12.

[0014] The second braking apparatus 15 has: a second brake shoe that can be placed in contact with and separated from the second brake wheel 14; a second brake spring that presses the second brake shoe against the second brake wheel 14; and a second electromagnet that acts against the second brake spring so as to separate the second brake shoe from the second brake wheel 14. A second electromagnetic coil is disposed on the second electromagnet.

[0015] The first main rope 6 is wound around the first drive sheave 8. The second main rope 7 is wound around the second drive sheave 12. Brake disks, or brake drums, etc., can be used as the first and second brake wheels 10 and 14, for example.

[0016] A first speed detector 16 is disposed on the first motor 9. A signal from the first speed detector 16 is input into a first brake controlling means 17. The first brake controlling means 17 controls the first braking apparatus 11 based on the signal from the first speed detector 16. Specifically, the first brake controlling means 17 energizes and de-energizes the first electromagnetic coil of the first braking apparatus 11 in response to the signal from the first speed detector 16.

[0017] A second speed detector 18 is disposed on the second motor 13. A signal from the second speed detector 18 is input into a second brake controlling means 19. The second brake controlling means 19 controls the second braking apparatus 15 based on the signal from the second speed detector 18. Specifically, the second brake controlling means 19 energizes and de-energizes the second electromagnetic coil of the second braking apparatus 15 in response to the signal from the second speed detector 18.

[0018] Figure 2 is a graph that shows time variations of rotational speed, deceleration, an energizing command to an electromagnetic coil, and current in the electromagnetic coil during emergency braking of one of the hoisting machines 4 and 5 from Figure 1.

[0019] If a command to make the car 1 stop urgently (an emergency stop command) is generated, electric current to the motors 9 and 13 is interrupted and the elec-

tromagnetic coils of the braking apparatuses 11 and 15 are also de-energized. If deceleration γ exceeds a predetermined value (threshold value) $\gamma 0$ at time T1, the brake controlling means 17 and 19 switch on energizing commands to the electromagnetic coils. Thus, braking force from the braking apparatuses 11 and 15 is reduced, reducing deceleration γ.

[0020] If deceleration γ is subsequently lower than the predetermined value $\gamma 0$ at time T2, the brake controlling means 17 and 19 switch off the energizing commands to the electromagnetic coils. Thus, the braking force from the braking apparatuses 11 and 15 is increased, increasing the deceleration γ.

[0021] The first and second brake controlling means 17 and 19 execute such switching on and off as energizing commands independently from each other until time T3 when the first and second hoisting machines 4 and 5 stop. Thus, the first and second hoisting machines 4 and 5 are decelerated and stopped at a rate of deceleration close to the predetermined deceleration $\gamma 0$.

[0022] In an elevator apparatus of this kind, because the brake controlling means 17 and 19 detect the state of rotation of the respective hoisting machines 4 and 5, i.e., deceleration, during emergency braking, and control the braking force from the respective braking apparatuses 11 and 15 in response to the detected deceleration, the hoisting machines 4 and 5 can be decelerated and stopped more appropriately during emergency braking.

Embodiment 2

[0023] Next, Figure 3 is a structural diagram that shows an elevator apparatus according to Embodiment 2 of the present invention. In the figure, an emergency stop detecting means 20 is connected to first and second brake controlling means 17 and 19. The emergency stop detecting means 20 detects generation of an emergency stop command, and activates control of the braking forces from the first and second brake controlling means 17 and 19 synchronously. The rest of the configuration is similar to that of Embodiment 1.

[0024] In an elevator apparatus of this kind, because activation of control action of the braking forces from the first and second brake controlling means 17 and 19 is synchronized by the emergency stop detecting means 20, differences in tension between the first and second main ropes 6 and 7 can be reduced, enabling damage to the main ropes 6 and 7 to be prevented.

Embodiment 3

[0025] Next, Embodiment 3 of the present invention will be explained. In Embodiment 2, deceleration of the hoisting machines 4 and 5 was detected by the brake controlling means 17 and 19, but in Embodiment 3, rotational speed of the hoisting machines 4 and 5 is detected. Specifically, the brake controlling means 17 and 19 generate control target speeds for deceleration at a predetermined rate of deceleration using the rotational speeds of the respective hoisting machines 4 and 5 during emergency stop command generation as initial values, and control the braking force from the braking apparatuses 11 and 15 of the respective hoisting machines 4 and 5 in such a way that the rotational speeds of the respective hoisting machines 4 and 5 follow the control target speeds. The rest of the configuration is similar to that of Embodiment 2.

[0026] Figure 4 is a graph that shows time variations of rotational speed, an energizing command to an electromagnetic coil, and current in the electromagnetic coil during emergency braking of one of the hoisting machines 4 and 5 from Figure 3. In the figure, time T1 is the time at which the generation of the emergency stop command is detected, and the rotational speed of the hoisting machines 4 and 5 at that time is V0. The brake controlling means 17 and 19 perform the following calculations, where $\pm$ V1 are upper and lower limit values of control speed, γ is a predetermined rate of deceleration, and t is elapsed time from time T1:

$$V2(t) = (V0 + V1) - \gamma \times t \ldots (1)$$

$$V3(t) = (V0 - V1) - \gamma \times t \ldots (2)$$

[0027] Expression 1 above is a control target speed pattern that constitutes an upper limit, and Expression 2 is a control target speed pattern that constitutes a lower limit.

[0028] The brake controlling means 17 and 19 compare the rotational speeds V(t) of the hoisting machines 4 and 5 at that time and the control target speed pattern, and energize the electromagnetic coils if V(t) is less than or equal to V3(t). If V(t) is greater than or equal to V2(t), the electromagnetic coils are de-energized. By controlling the braking apparatuses 11 and 15 using an algorithm of this kind, the hoisting machines 4 and 5 can be decelerated and stopped at a deceleration in a vicinity of the predetermined rate of deceleration γ.

[0029] Thus, the hoisting machines 4 and 5 can also be decelerated and stopped during emergency braking more appropriately by controlling braking force in response to rotational speeds of the hoisting machines 4 and 5 instead of deceleration.

Embodiment 4

[0030] Next, Figure 5 is a structural diagram that shows an elevator apparatus according to Embodiment 4 not part of the present invention. In the figure, braking apparatuses 11 and 15 are controlled by a shared brake controlling means 21. The brake controlling means 21 detects deceleration of the second hoisting machine 5 during emergency braking, and controls braking force from

the first and second braking apparatuses 11 and 15 in response to the detected deceleration. The specific method for controlling the braking force is similar to that of Embodiment 1.

[0031] In an elevator apparatus of this kind, because the brake controlling means 21 detects deceleration of the second hoisting machine 5 during emergency braking, and controls the braking force from the braking apparatuses 11 and 15 in response to the detected deceleration, the hoisting machines 4 and 5 can be decelerated and stopped more appropriately during emergency braking. Because one brake controlling means 21 is used for the first and second hoisting machines 4 and 5, the number of brake controlling means 21 and speed detectors 18 can be reduced, thereby enabling costs to be reduced.

[0032] Moreover, in Embodiment 4, the braking forces from the braking apparatuses 11 and 15 are controlled by detecting deceleration of the second hoisting machine 5, but the braking forces from the braking apparatuses 11 and 15 may also be controlled in response to the rotational speed of the second hoisting machine 5, as shown in Embodiment 3.

Embodiment 5

[0033] Next, Figure 6 is a structural diagram that shows an elevator apparatus according to Embodiment 5 not part of the present invention. In the figure, braking apparatuses 11 and 15 are controlled by a shared brake controlling means 22. The brake controlling means 22 detects deceleration that constitutes a running state of a car 1 during emergency braking, and controls braking force from the first and second braking apparatuses 11 and 15 in response to the detected deceleration. The specific method for controlling the braking force is similar to that of Embodiment 1.

[0034] The brake controlling means 22 detects the deceleration of the car 1 based on a signal from a speed detector 23 that generates a signal that corresponds to the speed of the car 1. The speed detector 23 can be disposed on a speed governor 24, for example. In addition, a counterweight is divided into: a first counterweight 2a that is suspended by a first main rope 6; and a second counterweight 2b that is suspended by a second main rope 7.

[0035] In an elevator apparatus of this kind, because the brake controlling means 22 detects deceleration of the car 1 during emergency braking, and controls the braking force from the braking apparatuses 11 and 15 in response to the detected deceleration, the hoisting machines 4 and 5 can be decelerated and stopped more appropriately during emergency braking.

[0036] Moreover, in Embodiment 5, the braking forces from the braking apparatuses 11 and 15 are controlled by detecting deceleration of the car 1, but the braking forces from the braking apparatuses 11 and 15 may also be controlled in response to a running speed of the car 1 that constitutes a running state of the car 1. In that case, the brake controlling means 22 generates a control target speed for deceleration at a predetermined rate of deceleration using the running speed of the car 1 during emergency stop command generation as an initial value, and controls the braking force from the braking apparatuses 11 and 15 in such a way that the running speed of the car 1 follows the control target speed.

Embodiment 6

[0037] Next, Figure 7 is a structural diagram that shows an elevator apparatus according to Embodiment 6 not part of the present invention. In the figure, braking apparatuses 11 and 15 are controlled by a shared brake controlling means 21. A braking control stopping means (a switch) 25 is disposed between the brake controlling means 21 and the first braking apparatus 11.

[0038] An emergency stop detecting means 26 is connected to the brake controlling means 21 and the braking control stopping means 25. The emergency stop detecting means 26 detects generation of an emergency stop command, and activates control of the braking force from the brake controlling means 21, and immediately activates braking by disconnecting the first braking apparatus 11 from the brake controlling means 21. During emergency braking, the brake controlling means 21 controls braking force from the second braking apparatus 15 that is subject to control such that deceleration of the second hoisting machine 5 that is subject to control is at predetermined rate of deceleration.

[0039] In an elevator apparatus of this kind, because braking is immediately activated during emergency braking by disconnecting the first braking apparatus 11 from the brake controlling means 21, the car 1 can be stopped more reliably by the braking apparatus 11 even if a fault has occurred in the control of the braking force by the brake controlling means 21. In other words, in Embodiment 6, a method in which the hoisting machine 4 is immediately made to perform a braking action while controlling deceleration of the hoisting machine 5 has been chosen as an appropriate decelerating and stopping method for the hoisting machines 4 and 5 during emergency braking. Consequently, using a control method of this kind, the hoisting machines 4 and 5 can be decelerated and stopped more appropriately during emergency braking.

Embodiment 7

[0040] Next, Figure 8 is a structural diagram that shows an elevator apparatus according to Embodiment 7 of the present invention. Embodiment 7 is a combination of Embodiments 5 and 6. Specifically, a braking control stopping means 25 is disposed between a brake controlling means 22 according to Embodiment 5 and a first braking apparatus 11, and is configured such that the first braking apparatus 11 is disconnected from the brake controlling

means 22 by the emergency stop detecting means 26 during emergency braking.

[0041] The hoisting machines 4 and 5 can also be decelerated and stopped more appropriately during emergency braking by an elevator apparatus of this kind.

[0042] Moreover, the brake controlling means can be configured using a circuit that includes a microcomputer, for example.

[0043] In the above examples, two hoisting machines were used, but three or more hoisting machines may also be used.

[0044] In addition, the generation of the emergency stop command may also be detected using a signal from an elevator control apparatus, or may also be independently detected by a brake controlling means. Approach or contact of a brake shoe toward or with a brake wheel, for example, may also be detected to determine whether an emergency stop command has been generated. It may also be determined that the emergency stop command has been generated if an electric current value of an electromagnetic coil of a braking apparatus is less than a predetermined value despite the speed of the car being greater than or equal to a predetermined value.

[0045] In the above examples, deceleration or speed was detected using a signal from a speed detector that is disposed on a hoisting machine or a speed governor, but a signal from a car speed sensor that is disposed on a car or a hoistway may also be used.

[0046] The brake controlling means may perform both braking control during normal operation and braking control during emergency stop command generation, or may also perform only braking control during the emergency stop command generation. In the latter case, braking control during normal operation can be performed by a running controlling means, and a brake controlling means that is independent from the running controlling means can be used.

Claims

1. An elevator apparatus comprising:

a plurality of hoisting machines (4, 5) that have respective braking apparatuses (11, 15);
a car (1) that is raised and lowered by the hoisting machines; and **characterised by**
a plurality of brake controlling means (17, 19) that control the respective braking apparatuses (11, 15) individually,
an emergency stop detecting means (20) that detects generation of an emergency stop command, and synchronously activates control of the braking forces by the brake controlling means (17, 19),
wherein the respective brake controlling means (17, 19) detect states of rotation of the respective hoisting machines (4, 5) during emergency braking, and control braking forces from the respective braking apparatuses (11, 15) in response to the detected states of rotation.

2. An elevator apparatus according to Claim 1, wherein:

the respective brake controlling means (17, 19) generate control target speeds for deceleration at a predetermined rate of deceleration using rotational speeds of the respective hoisting machines (4, 5) during emergency stop command generation as initial values, and control braking forces from the braking apparatuses (11, 15) of the respective hoisting machines (4, 5) such that rotational speeds of the respective hoisting machines (4, 5) follow the control target speeds.

3. An elevator apparatus comprising:

a plurality of hoisting machines (4, 5) that have respective braking apparatuses;
a car (1) that is raised and lowered by the hoisting machines (4, 5);
a brake controlling means (21) that controls the braking apparatuses (11, 15); and **characterised by**
an emergency stop detecting means (26) that detects generation of an emergency stop command, wherein:

the emergency stop detecting means (26) immediately makes the braking apparatus (11) of at least one of the hoisting machines (4) to perform a braking action by disconnection from the brake controlling means (21), when generation of an emergency stop command is detected; and
the brake controlling means (21, 22) controls a braking force from the braking apparatus (15) of at least one of the hoisting machines (5) that is subject to control during emergency braking such that deceleration of the hoisting machine (5) that is subject to control is at a predetermined rate of deceleration.

Patentansprüche

1. Aufzugsvorrichtung, umfassend:

eine Vielzahl von Hebemaschinen (4, 5), die jeweilige Bremsvorrichtungen (11, 15) aufweisen;
eine Fahrstuhlkabine (1), die von den Hebemaschinen angehoben und abgesenkt wird; und **gekennzeichnet durch**
eine Vielzahl von Bremssteuerungseinrichtungen (17, 19), welche die jeweiligen Bremsvor-

richtungen (11, 15) einzeln steuern,
eine Notstopp-Erfassungseinrichtung (20), welche die Erzeugung eines Notstoppbefehls erfasst und synchron die Steuerung der Bremskräfte durch die Bremssteuerungseinrichtungen (17, 19) aktiviert,
wobei die jeweiligen Bremssteuerungseinrichtungen (17, 19) während einer Notbremsung Drehzustände der jeweiligen Hebemaschinen (4, 5) erfassen und Bremskräfte von den jeweiligen Bremsvorrichtungen (11, 15) in Reaktion auf die erfassten Drehzustände steuern.

2. Aufzugsvorrichtung nach Anspruch 1, wobei:

die jeweiligen Bremssteuerungseinrichtungen (17, 19) Steuerungssollgeschwindigkeiten für eine Verzögerung mit einer vorbestimmten Verzögerungsrate unter Verwendung von Drehzahlen der jeweiligen Hebemaschinen (4, 5) während einer Notstoppbefehlserzeugung als Anfangswerte und Steuerungsbremskräfte von den Bremsvorrichtungen (11, 15) der jeweiligen Hebemaschinen (4, 5) derart erzeugen, dass Drehzahlen der jeweiligen Hebemaschinen (4, 5) den Steuerungssollgeschwindigkeiten folgen.

3. Aufzugsvorrichtung, umfassend:

eine Vielzahl von Hebemaschinen (4, 5), die jeweilige Bremsvorrichtungen aufweisen;
eine Fahrstuhlkabine (1), die von den Hebemaschinen (4, 5) angehoben und abgesenkt wird;
eine Bremssteuerungseinrichtung (21), welche die Bremsvorrichtungen (11, 15) steuert; und **gekennzeichnet durch**
eine Notstopp-Erfassungseinrichtung (26), welche die Erzeugung eines Notstoppbefehls erfasst, wobei:

die Notstopp-Erfassungseinrichtung (26) sofort die Bremsvorrichtung (11) zumindest einer der Hebemaschinen (4) dazu bringt, eine Bremsung durch Trennung von der Bremssteuerungseinrichtung (21) durchzuführen, wenn die Erzeugung eines Notstoppbefehls erfasst wird; und
die Bremssteuerungseinrichtung (21, 22) eine Bremskraft von der Bremsvorrichtung (15) mindestens einer der Hebemaschinen (5), die während der Notfallbremsung angesteuert wird, steuert, so dass die Verzögerung der Hebemaschine (5), die angesteuert wird, eine vorbestimmte Verzögerungsrate aufweist.

Revendications

1. Appareil ascenseur comprenant :

une pluralité de machines de soulèvement (4, 5) qui possèdent des appareils de freinage respectifs (11, 15) ;
une cabine (1) qui est soulevée et abaissée par les machines de soulèvement ; et **caractérisé par**
une pluralité de moyens de commande de frein (17, 19) qui commandent les appareils de freinage respectifs (11, 15) de manière individuelle ;
un moyen de détection d'arrêt d'urgence (20) qui détecte la génération d'une commande d'arrêt d'urgence, et active de manière synchrone le réglage des forces de freinage via les moyens de commande de frein (17, 19) ;
dans lequel les moyens de commande de frein respectifs (17, 19) détectent des états de rotation des machines de soulèvement respectives (4, 5) au cours d'un freinage d'urgence, et règlent les forces de freinage à partir des appareils de freinage respectifs (11, 15) en réponse aux états de rotation détectés.

2. Appareil ascenseur selon la revendication 1, dans lequel :

les moyens de commande de frein respectifs (17, 19) génèrent des vitesses cibles de commande pour une décélération à une vitesse de décélération prédéterminée en utilisant des vitesses de rotation des machines de soulèvement respectives (4, 5) au cours de la génération d'une commande d'arrêt d'urgence à titre de valeurs initiales, et règlent les forces de freinage à partir des appareils de freinage (11, 15) des machines de soulèvement respectives (4, 5) d'une manière telle que les vitesses de rotation des machines de soulèvement respectives (4, 5) suivent les vitesses cibles de commande.

3. Appareil ascenseur comprenant :

une pluralité de machines de soulèvement (4, 5) qui possèdent des appareils de freinage respectifs ;
une cabine (1) qui est soulevée et abaissée par les machines de soulèvement (4, 5);
un moyen de commande de frein (21) qui commande les appareils de freinage (11, 15) ; et **caractérisé par**
un moyen de détection d'arrêt d'urgence (26) qui détecte la génération d'une commande d'arrêt d'urgence ; dans lequel :

le moyen de détection d'arrêt d'urgence (26) fait immédiatement en sorte que l'appareil de freinage (11) d'au moins une des machines de soulèvement (4) mette en oeuvre une action de freinage via une déconnexion par rapport au moyen de commande de frein (21) lorsqu'une génération d'une commande d'arrêt d'urgence est détectée ; et

le moyen de commande de frein (21, 22) règle une force de freinage à partir de l'appareil de freinage (15) d'au moins une des machines de soulèvement (5) qui est soumise à la commande au cours d'un freinage d'urgence d'une manière telle que la décélération de la machine de soulèvement (5) qui est soumise à la commande s'effectue à une vitesse de décélération prédéterminée.

FIG. 1

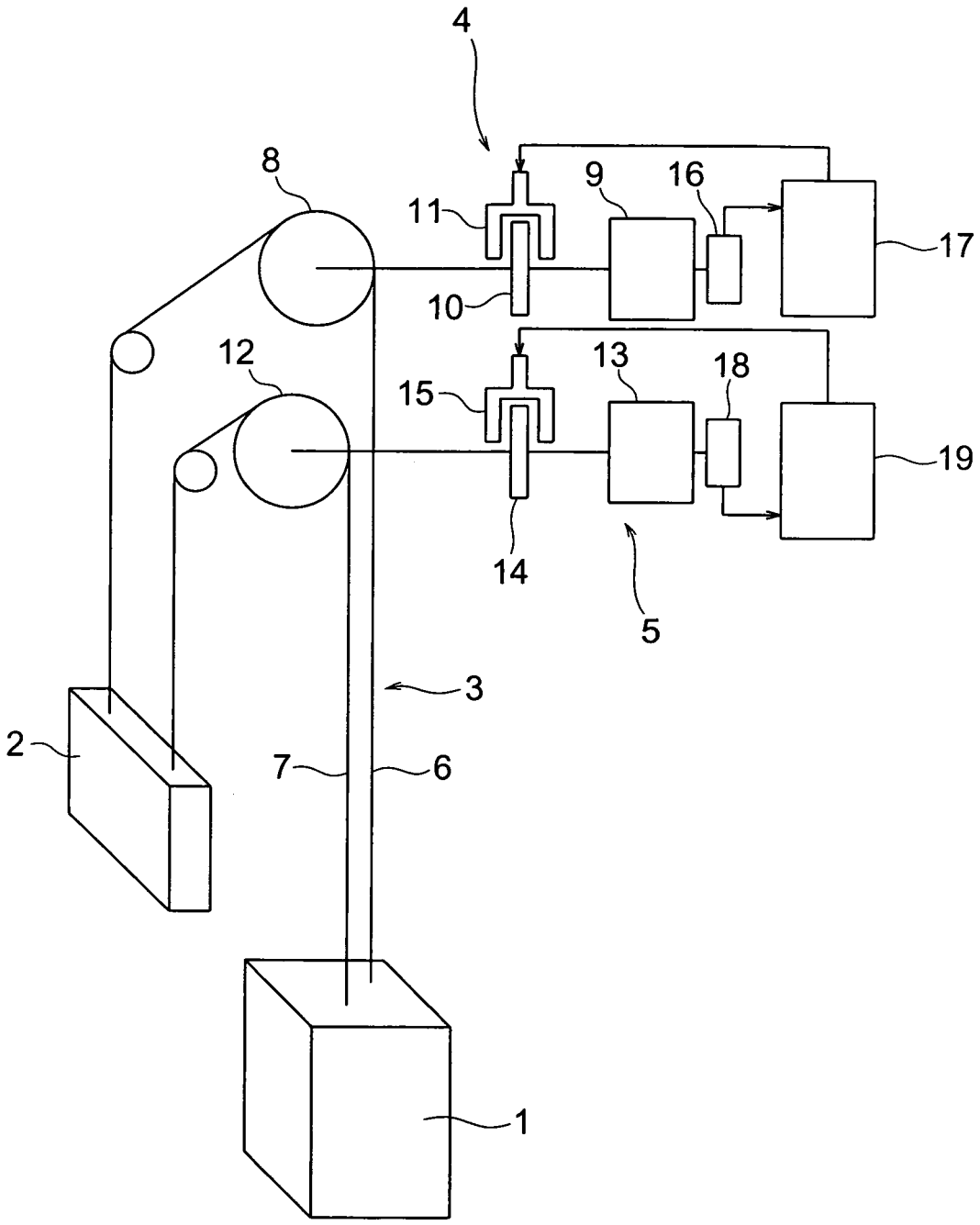


FIG. 2

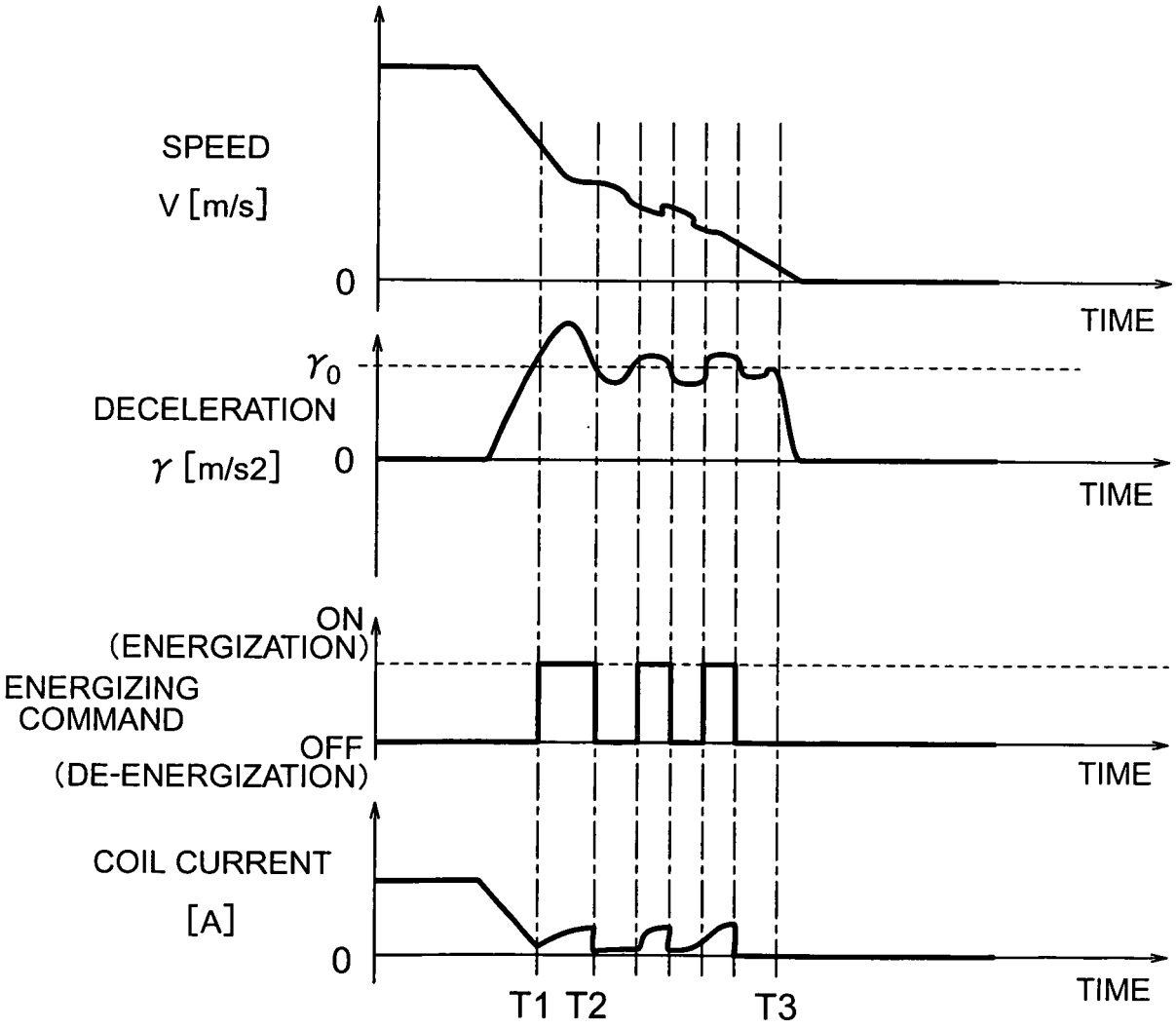

SPEED
V [m/s]
0
TIME
γ_0
DECELERATION
γ [m/s2]
0
TIME
ON
(ENERGIZATION)
ENERGIZING
COMMAND
OFF
(DE-ENERGIZATION)
TIME
COIL CURRENT
[A]
0
TIME
T1 T2
T3

FIG. 3

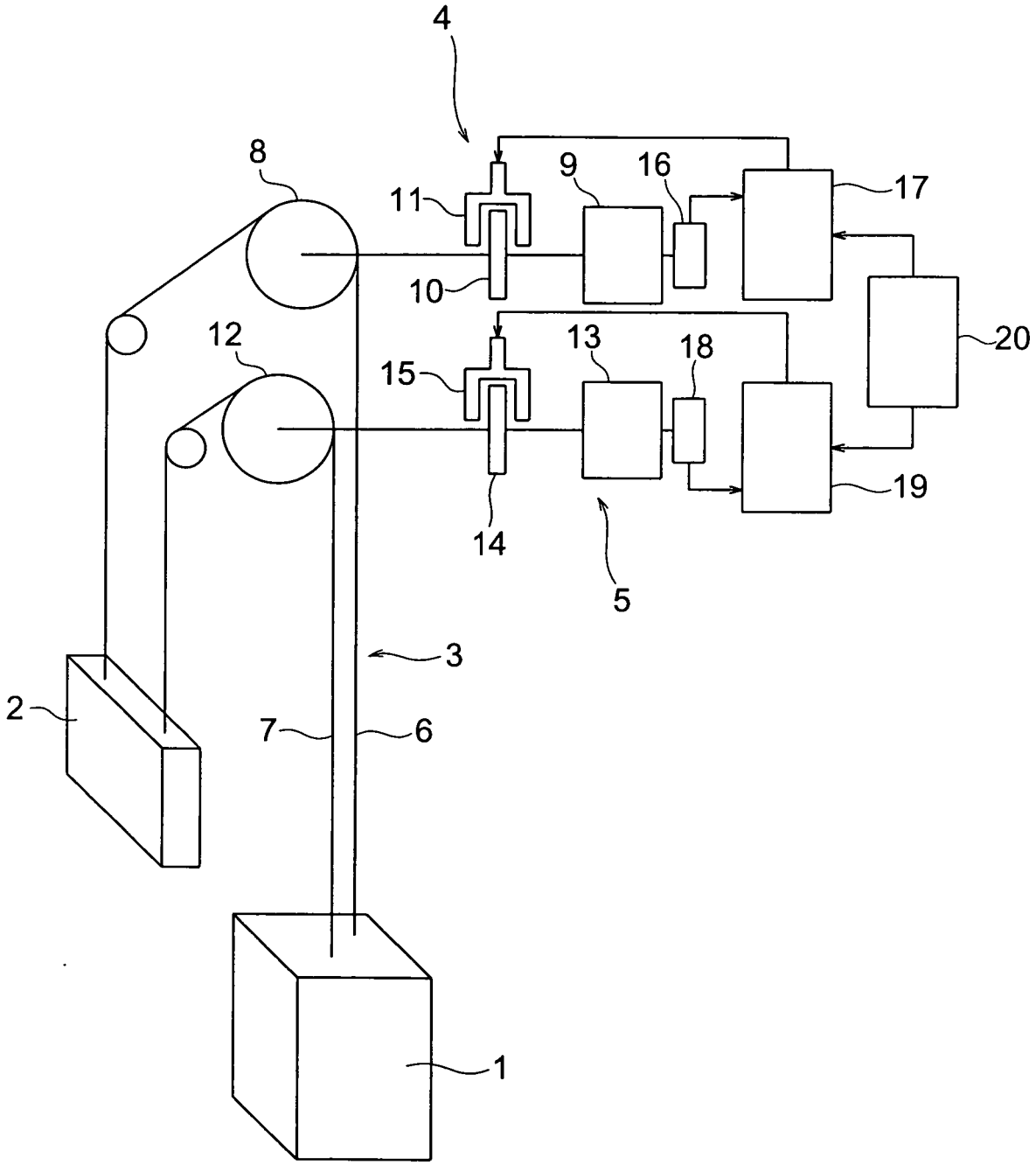


FIG. 4

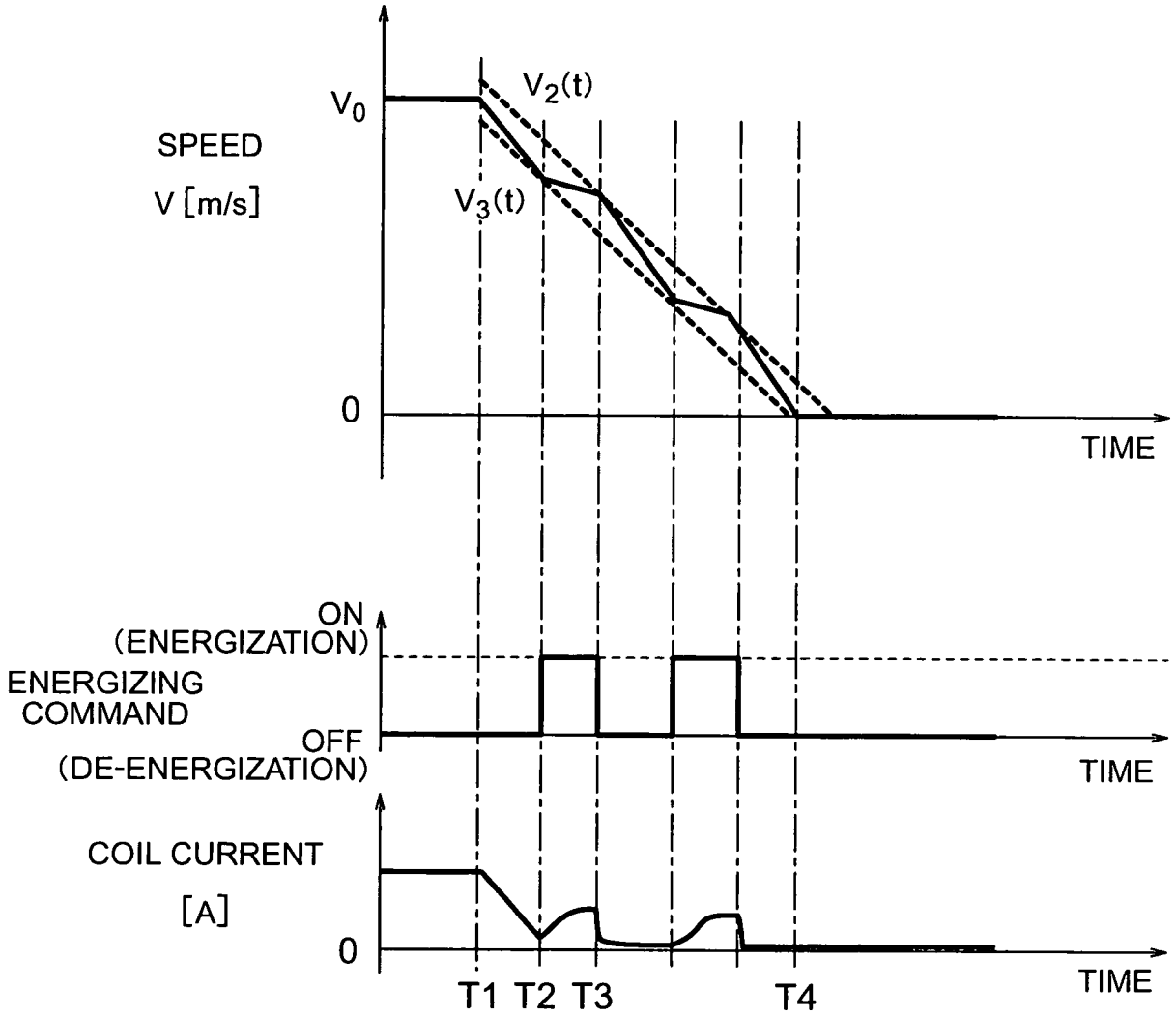

SPEED
V [m/s]
V_0
$V_2(t)$
$V_3(t)$
0
TIME
ON
(ENERGIZATION)
ENERGIZING
COMMAND
OFF
(DE-ENERGIZATION)
TIME
COIL CURRENT
[A]
0
TIME
T1 T2 T3
T4

FIG. 5

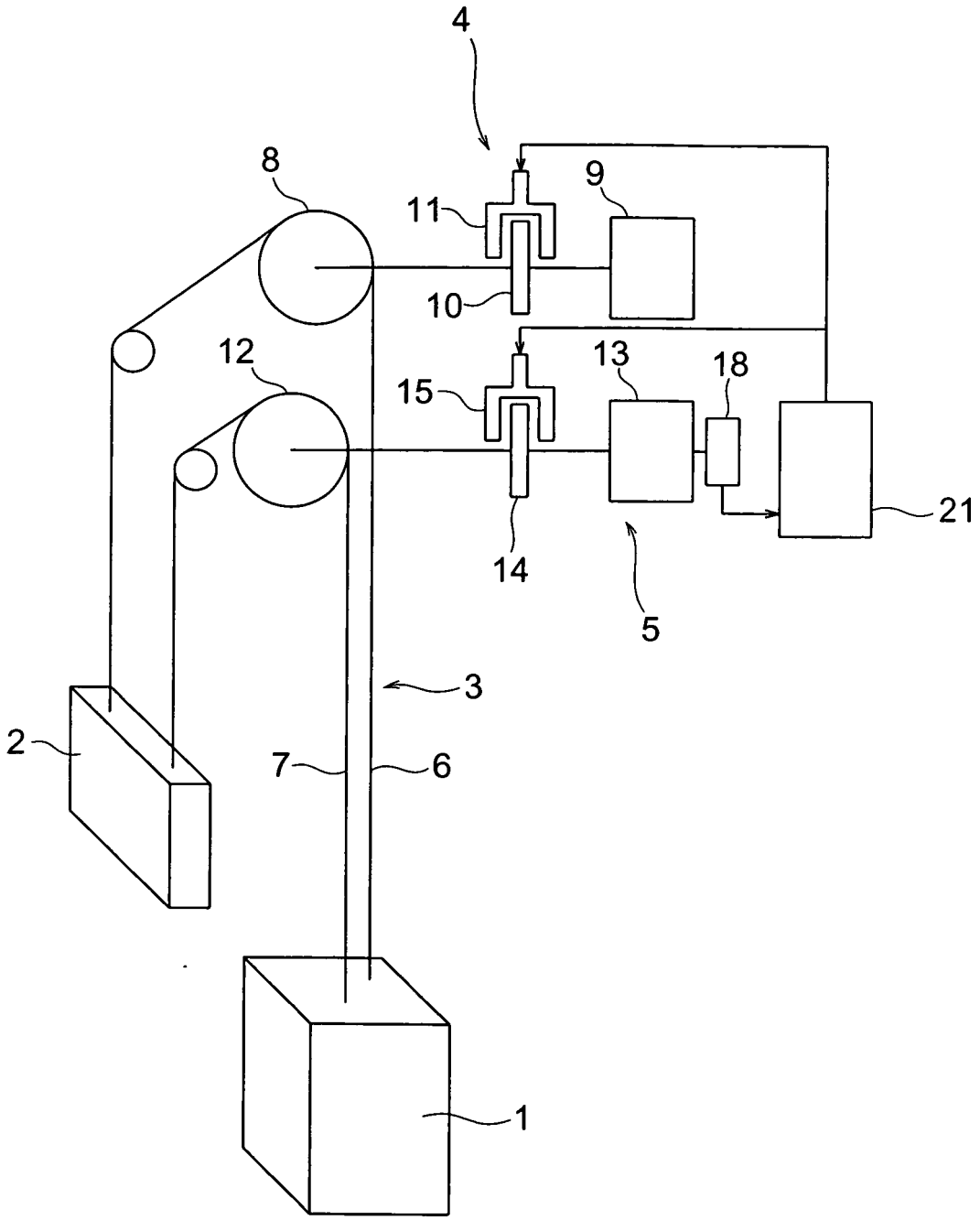


FIG. 6

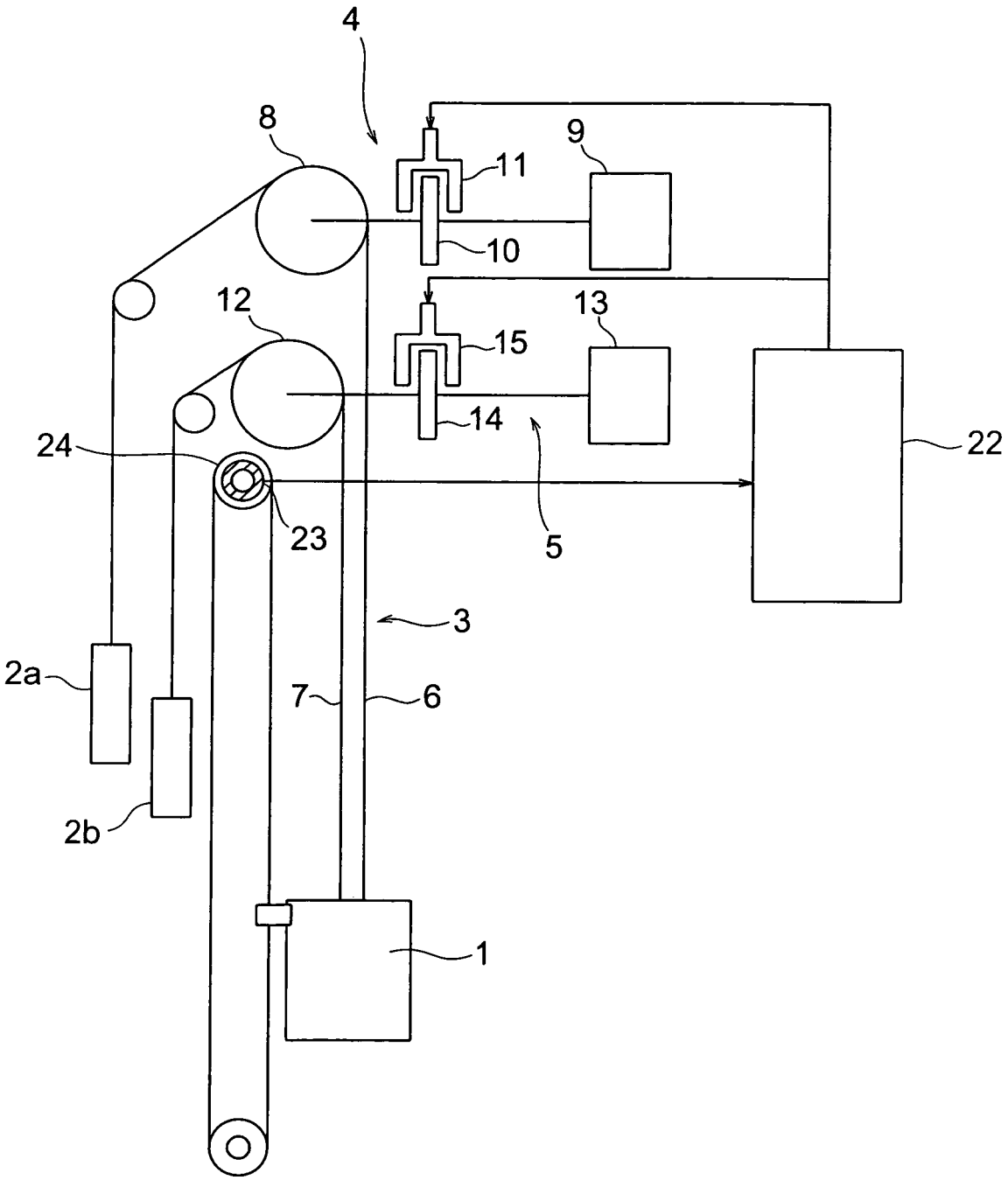


FIG. 7

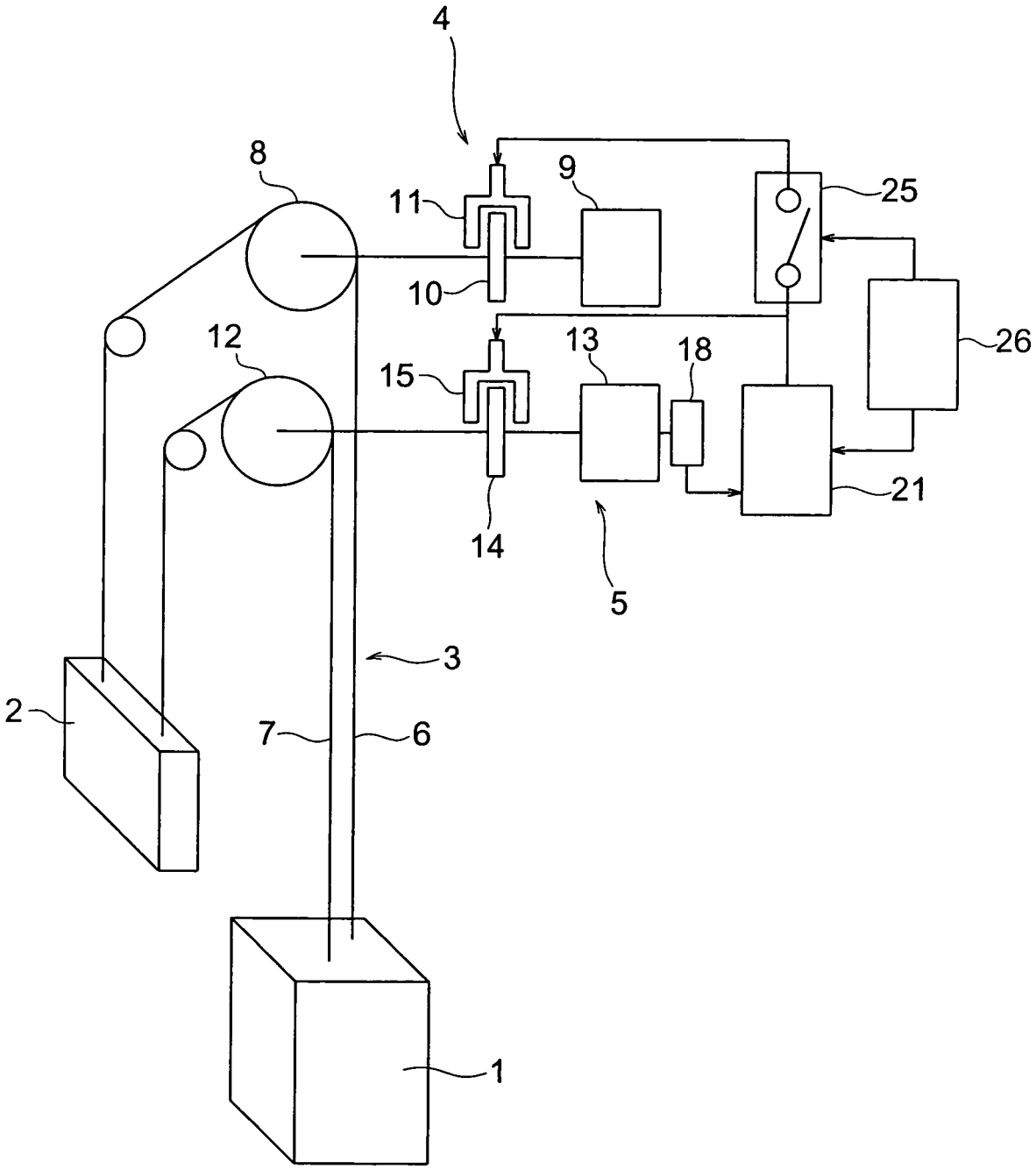
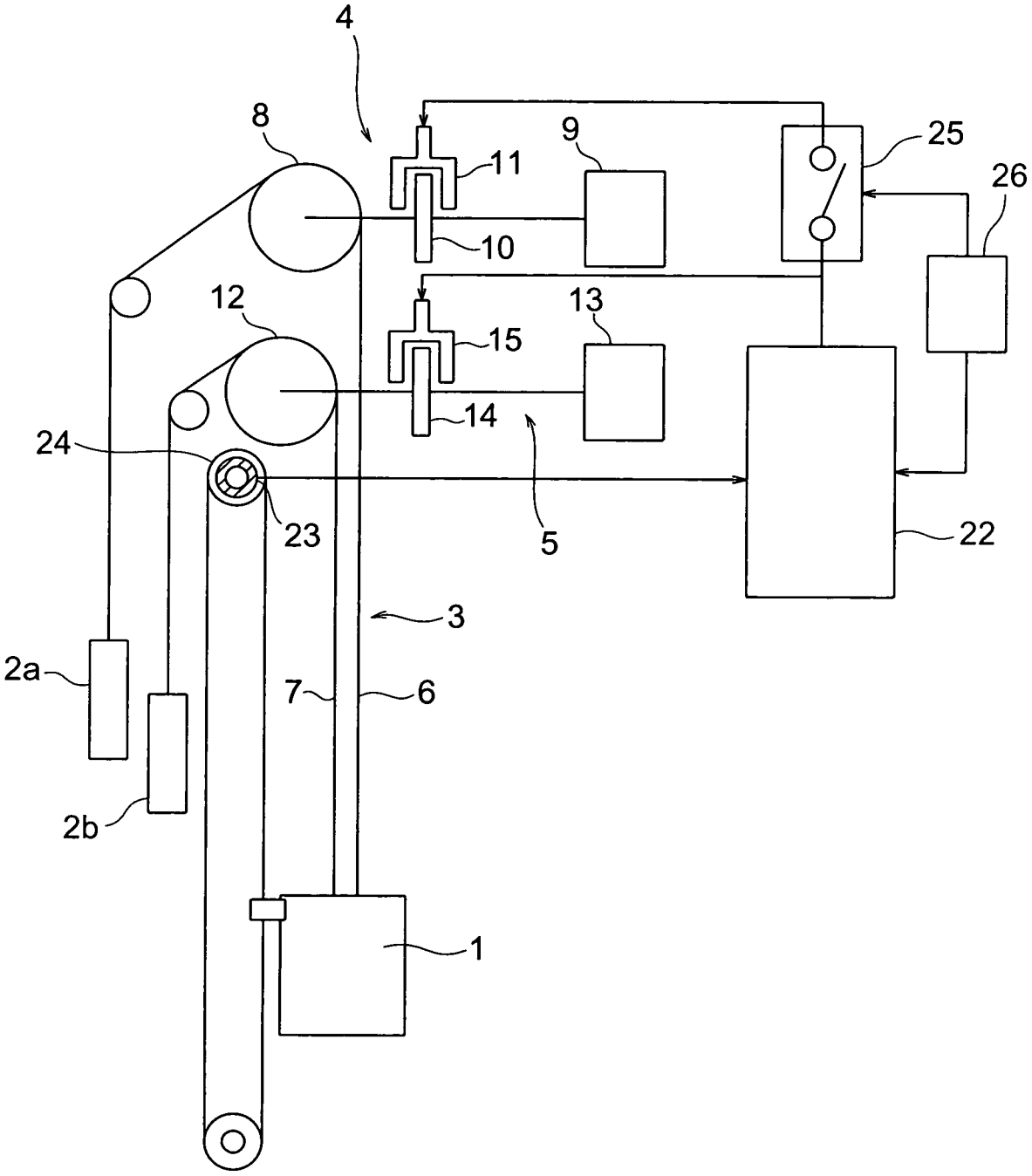


FIG. 8



REFERENCES CITED IN THE DESCRIPTION

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